

## OPTICAL FIBER PREFORMS

### ABSTRACT OF THE DISCLOSURE

Optical fiber preforms can comprise a glass preform structure with an inner cavity. A  
5 powder can be placed within the inner cavity having an average primary particle size of less than  
about one micron. The powder can be in the form of unagglomerated particles or a powder  
coating with a degree of agglomeration or hard fusing ranging from none to significant amounts  
as long as the primary particles are visible in a micrograph. Powders can be placed within a  
preform structure by forming a slurry with a dispersion of submicron/nanoscale particles within a  
10 cavity within the preform. In other embodiments, a powder coating is formed within a preform  
structure by depositing the powder coating directly from a reaction product stream. The  
formation of the powder coating can be formed within the reaction chamber or outside of the  
reaction chamber by flowing the product particle stream through a conduit leading to the preform  
structure. In additional embodiments, a powder coating is placed on an insert, e.g., a glass insert,  
15 that is subsequently placed within a preform structure.